

DYNAMIC NATURE OF ALIGNMENT BETWEEN MANUFACTURING STRATEGY AND BUSINESS STRATEGY : TWO CASE STUDIES

A Thesis Submitted
in Partial Fulfilment of the Requirements
for the Degree of

Master of Technology

by

S.SREEKANTH

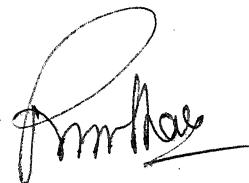
to the

**DEPARTMENT OF INDUSTRIAL & MANAGEMENT ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY KANPUR
MAY, 1993**

D 5/5/93
Praveen

CERTIFICATE

This is to certify that the present work on "*Dynamic Nature of Alignment between manufacturing strategy and business strategy : Two Case studies*", by S.Sreekanth has been carried out under my supervision and has not been submitted elsewhere for the award of a degree.



(R.R.K. Sharma)

Assistant Professor

May, 1993

Industrial & Management Engineering

Indian Institute of Technology

Kanpur-208016

IME-1993-M-SRE-DYN

- 6 DEC 1993/IME

CENTRAL LIBRARY
I.I.T., KANPUR

Reg. No. A.116793

ABSTRACT

In the present work, we have given a tentative framework of relationship between strategy making process (extensive problem solving, limited problem solving) and manufacturing policy and have given a few hypotheses. For verifying these, we have conducted two case studies, and found that they partially supported the hypotheses we had developed. In the process, we also discovered an important content of policy making in the dynamic context, that is, the suitable mode of manufacturing process, viz., job shop or assembly line. The limited evidence tends to imply that when a firm has a job shop and suitable production process after a period of time demands an assembly line kind of set up, then the firm has problems in financing the regeneration points. Also empirical evidence was available to show that the plant within a plant concept which was strongly recommended by earlier researchers may not be suitable in certain specific cases.

ACKNOWLEDGEMENT

I would like to express my gratitude to Dr.R.R.K.Sharma for his flexible approach and good suggestions during the course of the thesis work.

I thank the industry people for giving me their time and valuable information. Special thanks are due for Mr.S.C.Gupta, Chief General Manager (Tech.), EMA India Ltd. and Dr.C.B.Rao, Manager (Business planning), Ashok Leyland Ltd.

Also, I would like to thank all members of the IME family for making my stay at IIT Kanpur memorable.

CONTENTS

<u>CHAPTER</u>	<u>PAGE</u>
1. INTRODUCTION	1
2. LITERATURE REVIEW	6
3. DEVELOPMENT OF CONCEPTUAL FRAMEWORK AND FORMULATION OF HYPOTHESES	17
4. METHODOLOGY	20
5. ANALYSIS	24
5.1 Ashok Leyland Ltd.	24
5.2 EMA India Ltd.	28
5.3 Comparative Analysis	30
6. CONCLUSIONS AND FUTURE RESEARCH	31
6.1 Conclusions	31
6.2 Future Research	32
REFERENCES	33
APPENDIX A -- ASHOK LEYLAND LTD.	
APPENDIX B -- EMA INDIA LTD.	

CHAPTER 1

INTRODUCTION

The present work seeks to explore the alignment between manufacturing strategy and business strategy over a longer horizon. Strategic process research in the area of manufacturing although not new, lacks the benefit of accumulation of empirical findings. The empirical research considering the dynamic nature of relationship between business strategy and manufacturing strategy, to date is limited in scope.

Several authors have discussed the misalignment between manufacturing strategy and corporate strategy, leading to poor performance of industry at firm level. Skinner [1985] conceived a model for manufacturing strategy in which the competitive environment suggests a basic business strategy which, in turn, suggests the manufacturing mission or strategy. This mission can be encapsulated into choices made with respect to four competitive priorities: cost, quality, delivery and flexibility. The design of the manufacturing system can be made to fit the strategy by making appropriate trade-offs or decisions in certain key areas. Further, Skinner suggested five areas where trade-off decisions have to be made to assure a fit between business strategy and manufacturing strategy, these are: Plant and Equipment, Production, Planning & Control, Labour and Staffing, Production design / engineering and Organization and Management.

Manufacturing strategy can be viewed as a functional level strategy along with other functional level strategies such as financial strategy, marketing strategy, etc. The corporate strategy refers to two things, first, defining the corporate missions such as the business in which they will participate and second, procurement and distribution of

financial resources among different business units. The business strategy refers to distinctive competence that each strategic business unit (SBU) is trying to achieve over its competitors. At the core of business strategy is firm's decisions about product or market choices.

From the discussion above, we can see that the business goals put a certain requirement on the firm's manufacturing function. For instance, if the SBU's competitive strategy is to achieve the shortest delivery time in the industry, then the manufacturing facilities, systems and the set up have to be exclusively designed to achieve this particular end. If quality is crucial for a business to survive against the competition, then the manufacturing has to be designed to produce the highest quality products. According to Skinner, manufacturing strategy should not be achieving the most efficient manufacturing set up, but is achieving a manufacturing set up that meets the business strategy requirements in the best fashion. On the other hand a fully developed manufacturing strategy is even expected to have pro active role in deciding the strategic goals for the business unit.

According to Hayes and Wheelwright [1984] the following eight manufacturing strategy decision categories are quite helpful in working with a variety of firms.

Capacity - amount, timing, type

Facilities - size, location, specialization

Technology - equipment, automation, linkages

Vertical Integration - direction, extent, balance

Work force - skill level, wage policies, employment security

Quality - defect prevention, monitoring, intervention

Production planning / materials control - sourcing policies, centralization, decision rules

Organization - structure, control/reward systems, role of staff groups.

It may be noted that of the above decisions, technology choice, vertical integration and organization structure have strategic importance. The complementary and mutually supportive decisions taken in all these decision categories tend to build manufacturing strength in some direction. It is this collective and conscious decision making in these decision categories that determines the capability and strength of any manufacturing unit. Hence, manufacturing strategy decisions have implications for the strategic management as well.

The importance of strategy can be looked into by examining various alternatives, and no simple rules are available for making the choice. In the absence of strategy, there are no rules to guide search of new opportunities both inside and outside the firm and no yardsticks will be able to judge whether a particular opportunity is rare one or much better ones are likely to develop in future. Thus there may be a danger of premature commitment of resources, or failure to utilize resources available. Also project decision will be of poorer quality than in the firms with strategy because of lack of focus of its efforts. Hence advantage of not committing the firm's resources until the last moment are pitted against disadvantages of inefficient search, enhanced risks of making bad decisions and lack of control over the overall resource allocated pattern.

The reasons for the lack of focus of unsuccessful firms can possibly be explained by the following: Lack of basic understanding of the importance of the relationship between manufacturing strategy decisions and business unit strategy, inability or unwillingness to focus manufacturing resources on a limited set of manufacturing tasks necessary

to support price leadership, the inherent difficulties in successfully defining quality differentiation as a business unit strategy, or the inability of the top management to focus on quality differentiation as a dominant business unit strategy. Any of the above problems will result in a lack of compatibility between manufacturing decisions and business unit strategy.

Manufacturing strategy area has not been receiving adequate attention even in the business schools (Skinner [1985]). Most of the curriculum has been stressing the other functional areas such as marketing, finance, personnel and industrial relations, as manufacturing is thought to be associated with too much technicalities. As a result , it was noted by Skinner that most of the manufacturing and related decisions were left only to the plant managers. This probably resulted in manufacturing strategy not being integrated with the overall business strategy or other functional strategies. This resulted in misalignment of business strategy with manufacturing strategy or to use Skinner's words " manufacturing has been the missing link in corporate strategy ". Later works have concentrated mostly on the content of manufacturing strategy. Notable work of Stanley Miller [1983] helps us to identify the nature of misalignment between manufacturing and marketing strategies. Later Skinner has stressed the need for segmenting the production facilities to cater to significantly differing market segments. This led to the development of plant within a plant (PWP) concept.

We note that most of the research on manufacturing strategy is focused around a specific time interval when the misalignment is grave and the whole process of making the corporate strategy and its effect on manufacturing strategy is not researched much. We present a conceptual framework in this thesis about the process of corporate strategy

formulation and its effect on manufacturing strategy. Since we are focusing on a longer horizon, we choose case study type of research method as suggested by Yin [1989]. Owing to time and resource constraints, we limit our analysis to only two detailed case studies. We limit ourselves to hypotheses generation with little or no support from data.

The plan of the thesis is as follows:

In chapter 2, we present relevant literature review on manufacturing strategy and strategy making. In chapter 3, development of conceptual framework and formulation of hypotheses is presented. In chapter 4, the methodology with which we went about our work is discussed. In chapter 5, we present a detailed analysis of the specific case studies carried out. In chapter 6, conclusions and scope for further work is presented. In appendix A and appendix B, we give detailed account of the case studies conducted.

CHAPTER 2

LITERATURE SURVEY

The literature on manufacturing strategy is of recent origin and is also of limited scope. Skinner [1985] felt the continual neglect of manufacturing by the top management was because they thought manufacturing was too technical to deal with. The milestone effect of corporate neglect and evaluating manufacturing set up only on the criteria for cost has been empirically established. He has argued that this is due to substantial amount of delegation of decision making in manufacturing to lower levels. He also discussed a model for bringing about the marriage of strategy making and manufacturing policy making. However, this is applicable only to the specific period when grave misalignment between the two strategies is detected.

The process of determining manufacturing strategy and its content have both been addressed in the manufacturing strategy literature, although far more emphasis has been given to content of strategy than to the process by which it has been made. Broad agreement exists among the various authors with respect to both the process by which manufacturing strategy should be made and the appropriate content of manufacturing strategy. In recent manufacturing strategy literature, the manufacturing strategy content has been referred as the dimensions of manufacturing strategy. They are cost, quality, flexibility and dependability.

Some important trade-off decisions in manufacturing or "you can't have it both ways" according to Skinner are:

Decision area	Decision	Alternatives
Plant and equipment	Span of process	Make or buy
	Plant size	One big plant or several smaller ones
	Plant location	Locate near markets or locate near materials
	Investment decisions	Invest mainly in buildings or equipment or inventories
	Choice of equipment	General purpose or special purpose equipment
	Kind of tooling	Temporary, minimum tooling or " production tooling "
Production planning & control	Frequency of inventory taking	Few or many breaks in production for buffer stocks
	Inventory size	High inventory or a lower inventory
	Degree of inventory control	Control in greater detail or in lesser detail
	What to control	Controls designed to minimize machine downtime, labour cost, time in process or to maximize

(contd.)

		output of particular products or material usage
	Quality Control	High reliability and quality or low direct costs
	Use of standards	Formal, informal, or none at all
Labour and Staffing	Job specialization	Highly specialized or not highly specialized
	Supervision	Technically trained first-line supervisors or non-technically trained supervisors
	Wage system	Many job grades or few job grades; incentive wages or hourly wages
	Supervision	Close supervision or loose supervision
	Industrial engineers	Many or few
Product design/ engineering	Size of product line	Many customer specials, few specials or none at all
	Design stability	Frozen design or many engineering changes
	Technological risk	Use of new processes unproved by competitors or follow-the-leader policy
	Engineering	Complete packaged design or design-as-you go approach
	Use of manufacturing engineering	Few or many manufacturing engineers

(contd.)

Organization and management	Kind of organization	Functional, or product, or geographical, or process focus
	Executive use of time	High involvement in investment, production, planning, cost control, quality control or other activities
	Degree of risk assumed	Decisions based on much or little information
	Use of staff	Large or small staff group
	Executive style	Much or little involvement in detail; authoritarian or non-directive style; much or little contact with organization

(Ref. Skinner [1985] pp. 61-62)

There is essential agreement in the field's published work on the appropriate content of manufacturing strategy. The content of manufacturing strategy can be captured in two broad categories : i) decision areas that are of long term importance in the manufacturing function and ii) competitive priorities based on corporate and / or business unit goals. The conceptual beginnings of a content model of manufacturing strategy can be credited to the seminal work of Skinner. An important addition to the lists of strategic decision categories suggested by the various authors is the structure - infrastructure bifurcation developed by Hayes and Wheelwright [1984]. Structural decision categories address the " bricks and mortar " decisions of capital spending. Infrastructural decisions affect the people and systems that make manufacturing work.

According to Swamidass and Newell [1987] there is a real need for empirical studies for the development of formal theory of manufacturing strategy. Their study takes a step in that direction by clarifying, organizing and integrating terms and concepts relevant to manufacturing strategy in the process of conducting an empirical investigation of key manufacturing strategy variables. The empirical section of their study based on data gathered from thirty five manufacturers found that environmental uncertainty influenced manufacturing strategy variables such as manufacturing flexibility, and the role of manufacturing managers in strategic decision making. The manufacturing strategy variables, in turn, influenced business performance. They successfully adopted path analysis from social science research to test a hypothesized model of manufacturing strategy, environment and performance. Some of the conclusions from their study are: The greater the flexibility, the better the performance. Thus, flexibility seems to contribute competitive advantage to a manufacturer regardless of the manufacturing process used; The role of manufacturing managers in strategic decision making (RMMSDM) was a function of environmental uncertainty and the higher the RMMSDM the better the performance; An organization may find atleast some help in coping with the high uncertainties imposed by the environment by increasing manufacturing flexibility and by maintaining or ensuring the role of manufacturing managers in strategic decision making.

Duncan [1972] studied twenty two decision groups in three manufacturing and three research and development organizations to identify the characteristics of the environment that contribute to decision unit members experiencing uncertainty in decision making. He identified two dimensions of the environment, simple-complex; static-dynamic. Results indicate that individuals in decision units with dynamic-complex

environments experience the greatest amount of uncertainty in decision making. The data also indicate that the static-dynamic dimension of the environment is a more important contributor to uncertainty than the simple-complex dimension.

According to Miller, Stanley S.[1983], production systems cannot run efficiently if plant managers are assigned impossible tasks. No plant can serve a company's objectives well unless that plant has been given a mission that is internally consistent as well as congruent with larger corporate purposes. The seven classic missions of an assembly plant in order of increasing responsiveness to market conditions are low unit cost, high quality, high service level, wide line, custom service, product innovation and responsiveness to change. Investment requirements, marketing and sales strategies should be linked to the missions for effective performance.

Linking strategies to missions

Mission	Investment Requirements	Marketing Strategy	Sales Strategy
Low unit cost	Automation	Narrow line and conservative design	Price competition
High quality	Incremental performance	Special market segment	Price premium
High service level	Inventory	Image of dependability	Rapid

(contd.)

Wide line	Multiple setups and short runs	Broad market coverage	Full line
Custom service	Reserve capacity	Ability to respond	Analysis of customer needs
Product innovation	Product development	Market leadership	New market segment
Responsiveness to change	New technology	Industry leadership	New markets

(Ref. Miller, Stanley S. [1983])

According to Aharoni, Zvi & Eli [1978], the formulation of strategy for an organization begins with identifying the opportunities and risks in the environment. An optimal strategy for a manager seeking to increase autonomy would be to concentrate efforts on dominant environmental components.

According to Mintzberg [1978], the strategy formation can fruitfully be viewed as the interplay between a dynamic environment and bureaucratic momentum with leadership mediating between the two forces; the strategy formation over time appears to follow some important patterns in organizations, notably life cycles and distinct change-continuity cycles within these; and the study of the interplay between intended and realized strategies may lead us to the heart of the complex organizational process. This implies that leadership's predispositions have a substantial influence on the choice of corporate strategy.

According to Stobaugh & Piero Telesio [1983], skill in production, like any other valuable corporate asset, must be carefully and purposefully deployed if it is to serve as a fulcrum for competitive leverage. That is, it must be richly and deliberately integrated - both in its appointed tasks and in the ends toward which it is directed - with the product strategies it is to support. At all levels of business, as strategies shift, so must the mission of production.

Eisenhardt [1989] describes the process of inducting theory using case studies - from specifying the research questions to reaching closure. Some features of the process, such as problem definition and construct validation, are similar to hypothesis-testing research. Others such as within-case analysis and replication logic, are unique to the inductive, case-oriented process. According to her, theory developed from case study research is likely to have important strengths like novelty, testability and empirical validity, which arise from the intimate linkage with empirical evidence. Given the strengths of this theory-building approach and its independence from prior literature or past empirical observation, it is particularly well-suited to new research areas or research areas for which existing theory seems inadequate.

Eisenhardt and Bourgeois [1988] in their paper give answers to the following questions: How do executives make strategic decisions in industries where the rate of technological and competitive change is so extreme that market information is often unavailable or obsolete, where strategic windows are opening and shutting quickly, and where the cost of error is involuntary exit? How do top management teams divide the decision making responsibility? And how is risk of strategic error mitigated? They based their paper on a field investigation of four micro computer firms. Their results from high velocity environments consist of a set of

paradoxes which the successful firms resolve and unsuccessful firms do not. According to them high velocity environment puts a premium on high quality, fast, and innovative decisions. Innovativeness is achieved by experimentation in the face of threat and by keeping the strategic decision cycle short, intense, and focused. The high velocity environment also interacts with the life cycle of the plant and equipment and thus has implications for the strategy formulation, both corporate and manufacturing.

Miller and Friesen [1978] in their paper have given ten archetypes of strategy formulation. Successful archetypes are: the adaptive firm under moderate challenge, the adaptive firm in a very challenging environment, the dominant firm, the giant under fire , the entrepreneurial conglomerate and the innovator. Failure archetypes include: the impulsive firm, the stagnant bureaucracy, the headless giant and the aftermath. According to them, both successful and unsuccessful archetypes seem to constitute complex gestalts among environmental, organizational and strategy making variables.

Tosi, Aldag and Storey [1973] in their paper gave an evaluation of the Lawrence and Lorsch uncertainty sub scale. According to them, when sub scale scores are correlated with alternative measures of uncertainty, the results are disappointing. Internal reliability assessment and factor analysis of the scales suggest that the instrument is methodologically inadequate. The degree of internal uncertainty is a function of external uncertainty.

Dess and Beard [1984] used industrial classifications as a basis for operational definitions. A codification of six environmental dimensions was reduced to three : munificence (capacity), complexity (homogeneity-heterogeneity, concentration-dispersion) and

dynamism (stability-instability, turbulence). Interim and factor analytic techniques were used to explore the viability of these environmental dimensions. Implications of the research for building both descriptive and normative theory about organization-environment relationships are advanced.

Steers [1975] in his paper reviewed seventeen multivariate models of organizational effectiveness in terms of their primary evaluation criteria, their normative or descriptive nature, their generalizability and their derivation. Some of the evaluation criteria which frequented are: adaptability-flexibility, productivity, satisfaction, profitability, resource acquisition, absence of strain, control over environment, development, efficiency, employee retention, growth, integration, open communications, survival etc.

According to Porter [1979], the nature and degree of competition in an industry hinge on five forces: the threat of new entrants, the bargaining power of customers, the bargaining power of suppliers, the threat of substitute products or services and the jockeying among the current contestants. To establish a strategic agenda for dealing with these contending currents and to grow despite them, a company must understand how they work in its industry and how they affect the company in its particular situation.

According to Snow and Hambrick [1980], the strategic change occurs only when the organization modifies in a major way its alignment with the environment and substantially alters technology, structure and process to fit the new alignment. They addressed the major theoretical and methodological problems encountered in attempts to arrive at valid and reliable measures of organizational strategy. Their discussion is based on a series of empirical studies of the strategic behaviours of nearly two

hundred organizations in ten industries. Generally the change points coincide with life cycle changes or plant and equipment changes.

Miller, Danny [1987] in his study suggests that organizational structures and strategy making processes are highly interdependent and must be complementary in many ways to ensure good performance under challenging conditions. An empirical analysis of ninety seven small and medium-sized firms showed that structural formalization and integration were related to the levels of interaction and pro activeness among decision makers and to four aspects of rationality in decision making: analysis of decisions, planning, systematic scanning of environments, and explicitness of strategies. Centralization of authority was related to planning, risk taking, and consensus-building. Structural complexity had few associations with strategy making. Relationships between strategy making and structure were usually strongest among successful and innovative firms and seemed to contribute the most to performance in sizeable and innovative firms. Miller has categorised the strategy making into following three modes:

(i) Disjointed incrementalism (Interactive)

[Adaptive firms, Political arenas, Entrepreneurs,
Schizoid firms]

(ii) Rationalistic model

[Planning mode, Synoptic mode, impulsive firm,
Reactors]

(iii) Assertiveness

[Prospectors, Entrepreneurial firms, Depressive firms,
Stagnant firms, Reactors].

CHAPTER 3

DEVELOPING THE CONCEPTUAL FRAMEWORK

AND GENERATION OF HYPOTHESES

Several authors have discussed the misalignment in manufacturing strategy and business strategy, leading to poor performance of the industry at firm level, and recommendations as to what a good alignment should be, have been made. But these ignore the dynamic aspects of the alignment. But, causes leading to the misalignment of manufacturing strategy and business strategy have not been analyzed. We seek to undertake research to look into the causes of misalignment between business strategy and manufacturing strategy over a period of time. We hypothesise that strategy making process could be crucial for the success or failure of the firm and in particular the alignment between manufacturing strategy and business strategy. Hence we seek to do longitudinal case studies.

Skinner argued that there was total neglect of manufacturing area. Hence we can conclude from his study that no attempt has been made for an integrated corporate strategy taking manufacturing aspect into serious consideration and have identified various dimensions of manufacturing strategy to be considered. Swamidass and Newell stress the need for clarifying, organizing and integrating terms and concepts relevant to manufacturing strategy. Thus a conceptual framework can be developed from the existing literature for emphasis on alignment of manufacturing strategy with business strategy.

We can quote a number of famous cases to support the above contention. In the case of Ford Motors value rigidity led to non-integration of manufacturing strategy and business strategy. Henry

Ford continued to produce black coloured T car (black colour dried up the fastest, and to help increase the productive efficiency) and did not change to produce other colour cars inspite of the customer preferences. It ultimately led to the failure of the company.

Another case that can be quoted is that of IBM corporation. They had once made heavy investment in the 301 series of machines and after which came the revolutionary technological breakthrough which could produce machines that supported recursive languages. Since IBM had not recovered the investment on production facility, it stressed the marketing aspect of the business such as customer service and remained leaders in the computer business.

We hypothesize that the mode of strategic adjustment could be the major source of misalignment being considered. In literature, three major modes of strategic adjustment have been reported.

(i) Disjointed incrementalism (Interactive)

[Adaptive firms, Political arenas, Entrepreneurs,
Schizoid firms]

(ii) Rationalistic model

[Planning mode, Synoptic mode, impulsive firm,
Reactors]

(iii) Assertiveness

[Prospectors, Entrepreneurial firms, Depressive firms,
Stagnant firms, Reactors].

We have framed a few hypotheses after scanning the literature and by intuition. These are as follows:

Hypothesis 1

We hypothesize that other factors being relatively equal, choosing a meta strategy of making small and incremental strategic changes

will likely lead to a significant misalignment in business strategy and manufacturing strategy (over a period of time) for firms operating in moderate to high velocity environments.

Hypothesis 2

It is hypothesized that impulsive firms are likely to have significant misalignment in manufacturing strategy and business strategy.

Hypothesis 3

Proactors, rational and interactive modes of strategy making will likely result in good alignment of business strategy with manufacturing strategy. Specifically, rational and interactive modes of strategy making will likely have better alignment when the firm has formal integrated and decentralized structure.

Hypothesis 4

At the moment we are not sure about how reactive firms are going to perform. It is likely that reactive firms that are not technological leaders may succeed by stressing other functional areas such as marketing etc., whereas the firms not having other strengths are likely to have a poor alignment when following a reactive mode of adjustment.

CHAPTER 4

METHODOLOGY OF THE STUDY

We desire to analyze longitudinal data and wish to figure out the process of strategy making and study its impact on manufacturing strategy. Hence we chose case study method of research after studying all the possible alternatives. Case study method was selected because of its inherent advantages in this type of work. Eisenhardt describes the process of inducting theory using case studies - from specifying the research questions to reaching closure. Some features of the process, such as problem definition and construct validation, are similar to hypothesis-testing research. Others such as within-case analysis and replication logic, are unique to the inductive, case-oriented process. Theory developed from case study research is likely to have important strengths like novelty, testability and empirical validity, which arise from the intimate linkage with empirical evidence. Given the strengths of this theory-building approach and its independence from prior literature or past empirical observation, it is particularly well suited to new research areas or research areas for which existing theory seems inadequate.

Snow and Hambrick gave four different approaches for measuring strategy as investigator inference, self-typing, external assessment and objective indicators. Researchers can enhance the validity of their strategy measures if they rely on multiple sources of information, opportunities for strengthening the connection between concepts and measures of strategy are great, a single measure may not capture all of the subtle nuances of strategy and finally strategy research needs to become more comparative.

The case study is but one of several ways of doing research. In general, case studies are the preferred strategy when how or why questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary basis. Some of the other strategies for doing research include experiments, surveys, histories, analysis of archival information (as in economic studies) etc.

As a research endeavour, the case study contributes uniquely to our knowledge of individual, organizational, social and political phenomena. Not surprisingly, the case study has been a common research strategy in psychology, sociology, political science and planning. Case studies are even found in economics, where the structure of a given industry, or the economy of a city or a region, may be investigated by using a case study design. In all of these situations, the distinctive need for case studies arises out of the desire to understand complex social phenomena. In brief, case study allows an investigation to retain the holistic and meaningful characteristics of real-life events - such as individual life cycles, organizational and managerial processes, neighbourhood change, international relations and the maturation of industries.

Yin [1989] gave good comparison of case study research to other research strategies. According to him each strategy is a different way of collecting and analyzing empirical evidence. We were once taught to believe that case studies were appropriate for the exploratory phase of an investigation, that surveys and histories were appropriate for the descriptive phase, and that experiments were the only way of doing explanatory or causal inquiries. This hierarchical view, however, is incorrect according to him.

Relevant Situations for Different Research Strategies

Strategy	Form of Research Question	Requires Control over Behavioural Events	Focuses on Contemporary events
Experiment	how, why	yes	yes
Survey	who, what*, where	no	yes
	how many, how much		
Archival analysis	who, what*, where	no	yes/no
	how many, how much		
History	how, why	no	no
Case study	how, why	no	yes

* What questions, when asked as part of an exploratory study, pertain to all five strategies

(Ref. Yin [1989] page 17)

We conducted two case studies and collected longitudinal information on the following aspects of the firm: Strategy making, Organization structure, Contents of the manufacturing strategy, Market/Sales data and Financial data

We conducted open ended interviews and a cross section of employees of the firm were interviewed. Every important piece of information was cross checked by posing the same questions to different

people in the firm. Extensive use of published material on the firm's activities is made use. Choice of firms for the study often is an important part of the research work. Because of the resource and time constraints, we limited the number of cases to two. We decided to choose a firm that was relatively highly successful (over a period of time) and another firm which went through a turmoil atleast once. For the highly successful firm, we chose the EMA India Ltd., a highly successful firm in the induction heating equipment business. From the data collected from the firm in our previous interactions, it was known to have it smooth. Our other firm was Ashok Leyland Ltd., which has been known to have gone through rough weather before; once in the credit squeeze of the eighties and later due to competition from the Japanese collaboration companies manufacturing smaller sized trucks. The details of the cases are given in appendix A and appendix B. In the next chapter, we analyze the cases and show how they verify a few of the hypotheses we developed in chapter 3.

CHAPTER 5

ANALYSIS

5.1 Ashok Leyland Ltd.

In Sixties and Seventies

Ashok Leyland had decided to enter the market with multiple models. It had factory with facilities for each of the models set up separately. Its greatest asset was not the automation but the skills of the experienced workers. It appears that they had job shop kind of set up (Dixit [1982]). Although the company decided to pump many models into the market, it faced stiff competition from TELCO which decided to have fewer models produced in larger quantities to be pumped into the market. TELCO also had dual advantages with regard to prices and costs,(i) in terms of better learning curve effect due to assembly line kind of production and (ii) due to strategic vertical integration into machine tool manufacture to get advantage of cost as well as speed of implementation of its expansion programmes.

In Eighties

Ironically, Ashok Leyland did not have a specialized market segment for itself to justify its separate mode of production and also could not command a price premium for its products to enhance its profitability. In fact they were competing in the same market segment as were TELCO's models. Hence, when struck by the credit squeeze of the eighties and consequent demand recession, its share prices nose dived due to its poor financial performance. Its production set up has become a liability for itself. Acquiring newer facilities was not easy as machinery had become even more costlier, and it needed the help of

Hindujas who took them over in 1987 to bail them out. Only the huge investment by the Hindujas could see the reversal of fortunes of Ashok Leyland. Also, with the economic recession, the size of the truck started getting smaller and smaller to remain affordable to the average Indian customer. This posed problems for the Ashok Leyland and also the Japanese competition in the segment of smaller sized trucks.

In Nineties

In 1987, Hinduja-IVECO duo bought out the stake in Ashok Leyland of the UK based Rovers group. Recently they decided to up their stake from the current level of 38.6% to 51%. They will use the proceeds of the current issue to fund the company's ongoing Rs. 650 crore expansion and technology upgradation programme.

Ashok Leyland is presently down in the dumps and struggling to surface. For the first time since the Hinduja-IVECO partnership took up stake in the company, it has actually recorded losses. In the first six months of the last year (1992-93;computed from June to June), the company recorded losses to the tune of Rs. 25 crore. Compared to this, the company's net profits had been steadily increasing since the Hinduja takeover, finally speaking at Rs. 9.19 crore in 1991-92.

Of course, the Ashok Leyland management cannot be blamed for this debacle. The company like all others in the automobile industry, had bent its fender against the biggest demand recession, the country has faced in recent times. So the poor performance was inevitable.

Here is where Ashok Leyland displayed some savvy. Instead of slinking away and licking its wounds, the company's management decided to consolidate operations and introduce a new range of vehicles in an attempt to carve out a niche for itself and create a market for a new kind of

commercial vehicle: the medium commercial vehicle (MCVs), or known as the intermediate commercial vehicle (between six and twelve tonnes). Built with technology supplied by IVECO, these trucks will be in the seven, nine and eleven tonne gross weight categories. As these trucks have been awarded the International Truck of the Year Award for two consecutive years, the management as well as some industry watchers give the truck a good chance to make an impact on the market.

The Indian automobile industry has travelled a path of peaks and troughs. After long years marked by technological backwardness, official indifference and customer apathy, it entered a period of resurgence and technological renewal during the late eighties that held out high promises for the future.

However, the difficulties now faced by the industry points to its vulnerability to economic vicissitudes and exposes the lopsidedness of its development. What the industry needs is a strategy not merely to assist it to get out of its current travails but also to relaunch it as the spearhead of India's industrial resurgence.

Transport in India has traditionally been a sub-optimised economic activity marked by aged stock, low productivity, unremunerative fares and regulations of ownership and restrictions on operations. Inadequate investments on road laying have accentuated transport bottlenecks. Regrettably, the sweeping winds of liberalisation are yet to reach the transport sector in a big way despite it being a core infrastructure.

Ashok Leyland is not limiting its operations solely to the manufacture of commercial vehicles any more due to the above mentioned reasons. Its plant at Alwar is likely to get into the business of body building for buses while its other plants - at Hosur, Ennore and Bhandara

will now also concentrate on export of truck engines. Hindujas well-known for their trading ability are also looking in this aspect. In the coming months Ashok Leyland, through a subsidiary called Ashok Leyland Exports Limited, will also begin trade of non-company or purchased products. Another subsidiary, Ashok Leyland Information Technology Limited, is making foray into the lucrative, and booming, software exports business. These, however are not the really big ones on the anvil. The company is soon to set up two 500mW gas-based power plants in Vizag, with the backing of the Washington-based International Finance Corporation. With that, the company has found a toe-hold in the power sector that is opening up rapidly in the post-liberalisation period. Also on the cards is an oil refinery in Orissa, another business to be in at a time the economy is truly opening up. Clearly, the Hindujas believe in diversifying Ashok Leyland. And once they succeed in doing that, Ashok Leyland will not have to fear any recession in future.

It may be inferred that the company has chosen to do well in other strategic business areas such as oil refinery, power, software etc. But in the strategic business unit of commercial vehicles it found difficult to correct the problem. British Leyland had pursued a strategy of large number of models for the affluent society abroad. It did not work in the Indian context. Due to strong predisposition, Ashok Leyland impulsively followed the same policy in the Indian context. This may be a root cause for the failure. Actually what is required was an extensive problem solving approach or rationalistic mode of strategy making.

In contrast to TELCO's assembly line production, Ashok Leyland's job shop type of production was at a disadvantage. TELCO could turn out newer models on their production set up in less than twenty-four hours

time. Hence it appears that newer models on assembly line is a better proposition than newer models on job shop when size of market segment is high. Ashok Leyland made a very late shift from job shop type to assembly line type of production, that is in the late eighties and nineties.

5.2 EMA India Ltd.

The company is exploiting synergies in the distribution network and customers while going for diversification. The company has marketing agents in all the regions. Currently efforts are on to improve market share by stressing on quality. Though a small company, because of German collaboration, it is reputed for producing good quality machines. Manufacturing is made to order batch type or job shop depending on the relative frequency of the orders. They have strict quality control and they produce sturdy machines as is the requirement of the market. Having German collaboration helps them in giving better design specifications to customers. This also helps them to command better margins for their equipment. The company manages with minimum inventory. The estimates/requirements are constantly revised and inventory is kept at rock bottom levels to reduce on costs. Scheduling is due date based. Though the company has relative disadvantage with respect to cost, it delivers by far the most reliable machines. They are trying to cut down costs through various programmes taken up by R&D department. Competitors are trying to get past the company by aiming for low cost even at some risk to the reliability of the machine, as cost is the main criterion for the customer. The company is going for lower costs on war footing to stymie the prospect of reduced market share.

The managing director and the joint managing director are both from the family controlling the company. The structure is more or less

informal with major departments being sales, purchase, finance, imports, electrical design, mechanical design, R&D, production & assembly, quality control. Depending on the complexity of the order taken, inter departmental review meetings are held to sort out the problems. The company runs mostly on managing director's ideas. The company is able to give products of wide range of specifications with good quality. Presently the company is in maturity stage of the product life cycle for induction heating equipment. Some of the priorities for the company according to chief general manager (tech) are:

- * Providing flexibility (product variety) and thus manoeuvering the position in the market
- * Market penetration and improving market share
- * Enforcing cost reduction and controls in the company in order to achieve the internal rationalization and hence controlling the product cost
- * Achieving high levels of innovation in the products/processes and thus gaining an upper hand over the competitors
- * Introducing new products for existing and new markets
- * Reduction in set up time for jobs
- * Use of value analysis or product redesign
- * Increasing R&D effort

As the company has got reliable customers who are mostly brand loyal, there are opportunities for expanding into other fields of machines and equipment required by these customers. An established R&D can reduce import content and reduce their costs of manufacture. As there is constant interaction between various departments and the company being relatively small, there is good alignment between business strategy and manufacturing strategy as the company's products are made to order only. It can be inferred that the company did not face significant changes in

market characteristics. And the market size did not grow very much. Hence incremental decision process and limited problem solving worked. The company has not faced a major crisis in its twenty years of existence.

5.3 Comparative Analysis

One of our cases, Ashok Leyland Ltd., gives support to hypothesis 2 viz., Impulsive firms shall have poor alignment of manufacturing strategy and business strategy. Also when a firm faces close choice between job shop and assembly line kind of set up, then it is necessary to follow extensive problem solving approach; and also in such cases incremental approach could also be problematic. Also, it comes out that the strategy of PWP (plant within plant) may not work if not supported by the adequate size of the market segment. For example, Ashok Leyland had separate production set up for each of its models such as Taurus, Tusker, Cheetha etc.

It is evident from EMA India Ltd. case, that when one is sure that in times to come, there is no change in mode of production process, an approach of limited problem solving or incremental approach is sufficient.

CHAPTER 6

CONCLUSIONS AND FUTURE RESEARCH

6.1 Conclusions

We see that our case studies not only lend some support to the hypotheses we had framed, but also they reveal crucial contents of the dynamic aspects of the alignment between manufacturing strategy and business strategy. That is, when job shop set up and assembly line kind of production set up equally satisfy the company's objectives, then it should invoke extensive problem solving process for strategy making or should pursue a rationalistic model and carefully pursue a well integrated strategy across all functional areas such as marketing, manufacturing etc.

Another conclusion from our case studies is that the strategy of PWP (plant within plant) must be pursued with care only if supported by adequate market size and profits so that investment is recovered in a reasonable time period and regeneration is easily financed.

If a company is sure of the stability of its market segment, it may pursue limited problem solving approach or an incremental approach to strategy making would suffice.

We could analyze only two cases and hence our findings seem to be applicable under specific circumstances only. Hence, there is need for studying many more cases for making generalisations.

6.2 Future Research

Regeneration is an important consideration for the manufacturing organizations. If lot of capital is committed in manufacturing facilities, then it must be ensured that it is possible to survive in the market even when the technology changes. For example, IBM managed to be leaders by stressing service while investing massive amounts in manufacturing in face of volatile technology.

In the future work, more case studies are expected to reveal newer dimensions of synergies between manufacturing and other functional areas. We hope we have made a beginning in this direction.

REFERENCES

Aharoni, Yair., Zvi Mamon & Eli Segev. 1978. Performance and Anatomy in Organizations: Determining dominant environmental components, *Management Science*, Vol. 24, No. 9.

Ansoff, Igor H. 1965. *Corporate Strategy*, McGraw Hill.

Ansoff, Igor H. 1979. *Strategic Management*, Macmillan, 1979.

Ansoff, Igor H. 1984. *Implanting Strategic Management*, Prentice Hall International, 1984.

Dess, Gregory G. & Donald W. Beard. 1984. Dimensions of task environments, *Administrative Science Quarterly*, 29: 52-73.

Dixit, M.R. 1982. *Ashok Leyland Ltd.* Case of IIM Ahmedabad, India.

Duncan, Robert B. 1972. Characteristics of organizational environments and perceived environmental uncertainty, *Administrative Science Quarterly*, 17: 313-327.

Eisenhardt, Kathleen M. 1989. Building theories from case study research, *Academy of Management Review*, Vol. 14, No. 4, 532-550.

Eisenhardt, Kathleen M. & Bourgeois L.J. 1988. Strategic decision processes in high velocity environments: Four cases in micro computer industry, *Management Science*, Vol. 34, No. 7.

Ettlie, John E., Michael C. Burstein & Avi Fiegenbaum. 1990. *Manufacturing Strategy - The research agenda for the next decade*, Kluwer Academic Publishers.

Hayes, Robert H. & Steven C. Wheelwright. 1984. *Restoring our Competitive Edge - Competing through Manufacturing*, John Wiley & Sons Inc.

Miller, Danny. 1987. Strategy making and structure : Analysis and implications for performance, *Academy of Management Journal*, Vol. 30, No. 1, 7-32

Miller, Danny. & Peter H. Friesen. 1978. Archetypes of strategy formulation, *Management Science*, Vol. 24, No. 9.

Miller, Stanley S. 1983. Make your plant manager's job manageable, *Harvard Business Review*, Jan-Feb, pp. 69-74.

Mintzberg, Henry. 1978. Patterns in strategy formation, *Management Science*, Vol. 24, No. 9.

Murray Jr., Edwin A. 1978. Strategic choice as a negotiated outcome, *Management Science*, Vol. 24, No. 9.

Porter, Michael E. 1979. How competitive forces shape strategy, *Harvard Business Review*, Mar-Apr, pp. 137-145.

Pugh, D.S., D.J.Hickson, C.R.Hinings & C.Turner. 1968. Dimensions of organization structure, *Administrative Science Quarterly*, 13: 65-105

Skinner, Wickham. 1985. *Manufacturing: The Formidable Competitive Weapon*, John Wiley.

Snow, Charles C. & Donald C. Hambrick. 1980. Measuring organizational strategies: Some theoretical and methodological problems, *Academy of Management Review*, Vol. 5, No. 4, 527-538.

Steers, Richard M. 1975. Problems in the measurement of organizational effectiveness, *Administrative Science Quarterly*, Vol. 20.

Stobaugh, Robert & Piero Telesio. 1983. Match manufacturing policies and product strategy, *Harvard Business Review*, Mar-Apr, pp. 113-120.

Swamidass, Paul M. & William T. Newell. 1987. Manufacturing strategy, environmental uncertainty and performance: a path analytic model, *Management Science*, Vol. 33, No. 4.

Tosi, Henry., Ramon Aldag & Ronald Storey. 1973. On the measurement of environment: An assessment of Lawrence and Lorsch environmental uncertainty scale, *Administrative Science Quarterly*, 18: 27-36.

Yin, Robert K. 1989. *Case Study Research - Design and Methods*, Sage Publications.

APPENDIX A

ASHOK LEYLAND LTD.

Historical Profile

The company was set up in 1948 under the name Ashok Motors Ltd., to assemble the well-known Austin cars. In 1950 it acquired the sole rights to import, distribute and progressively manufacture Leyland commercial vehicles, manufactured by Leyland Motor Corporation, U.K. In 1955, it signed a technical and financial collaboration agreement with this company to manufacture medium and heavy duty commercial vehicles. The name of the company was changed to Ashok Leyland Ltd. in the same year. The original programme of the company envisaged production of 1500 medium duty comet chassis. In 1958, the company obtained a license to produce 300 heavy duty vehicles per annum and to increase the production of medium duty vehicles to 3000. In 1959, the company set up a subsidiary called, Ennore Foundries Ltd. to supply castings to the main factory. It was converted into public limited company in the following year. The vehicle capacity of the company was expanded to 5000 in the same year. In 1965, the company started the assembly of heavy duty beaver and chassis for defence applications. Between 1956 and 1965, the sales of the company increased from Rs. 2.86 crore to Rs. 20.2 crore. The profits before tax increased from Rs. 8.6 lakh to Rs. 2 crore.

In 1970, double decker buses were included in the product range. It became the only producer of these buses. The capacity for comet vehicles was expanded to 7000 vehicles per annum. It obtained a letter of intent to expand the capacity further to 10,000 vehicles. This letter of intent was converted into an industrial license in 1972. In 1975, a new

passenger vehicle named, Ashok Viking, with greater passenger carrying capacity and fuel economy was introduced in the domestic market. The technical collaboration agreement with British Leyland ended in the same year and the Government of India did not permit the company to renew the collaboration. In 1978, two new models - a passenger vehicle known as Cheetha and a 13 tonner haulage vehicle known as Tusker were introduced. the expansion plan was completed. The company delivered 100,000 th vehicle on 1 Dec 1978. For the first time, an Indian national was appointed as the managing director in 1978. Earlier this post was held by an expatriate from Britain. The company chairmanship was held by an Indian. In 1978, the company formulated a three year plan to raise its capacity to 12,500 and modernize its plant at a cost of Rs. 36 crore. The company obtained a license to increase the capacity of heavy vehicles to 2000. In 1979, the company obtained permission to shift the production capacity of 1000 heavy duty vehicles to a new location. A heavy duty vehicle named Taurus, with a gross vehicle weight of 18 tonnes, was introduced in the market. The license for the other 1000 was merged with the licensed capacity of 12500 medium duty vehicles. In the same year, the company submitted an application for increasing the licensed capacity from 12500 to 40000 medium duty vehicles.

The new location chosen for manufacturing heavy duty vehicles was Hosur. The Hosur plant was commissioned in Sep 1980. The plant went on stream within nine months of starting the construction work on a green site, in the same year. The company embarked on a programme to manufacture integral buses. It obtained the letter of intent to expand its capacity from 12500 to 40000. To implement the programme, the company entered into agreements with the State Governments of Maharashtra and

Rajasthan to set up manufacturing facilities in the backward areas of these states. The move to set up manufacturing facilities in the backward areas was in keeping with the policy of the Government of India to encourage the industrialisation of backward areas. Various state governments vied with each other to attract the company to their state. The incentive packages offered by Maharashtra and Rajasthan in terms of land development facilities, sales tax and power tariff concessions and provision of infrastructure facilities were the most attractive.

Between 1970 and 1980, the sales of the company increased from Rs. 33.4 crore to Rs. 233.7 crore with a corresponding increase in profits before tax from Rs. 2.18 crore to Rs. 12.65 crore. The employee strength had gone up from 3911 to 7878 in the same period. The total assets had multiplied to Rs. 155.9 crore from Rs. 24.7 crore. By 1990, the sales value of the company reached Rs. 861.5 crore and profits before tax read Rs. 30.6 crore. The total assets multiplied to Rs. 375.2 crore. Along with the capacity for vehicles, the capacity for industrial and diesel engines was increased from 720 per annum in 1975 to 1500 per annum in 1978. In 1980, it was increased further to 1875 per annum. By 1990, it reached 4400 per annum. In 1987, LRLIH Limited, which holds the overseas share holding of Ashok Leyland, and which was previously owned by the Rover Group (erstwhile Leyland Group) was acquired by a joint venture of the Hinduja Group and IVECO, a fully-owned subsidiary of FIAT, heralding a new chapter in the history of Ashok Leyland. The details of the performance of the company are given in the exhibit.

Manufacturing

The company started manufacturing its vehicles in its factory at Ennore, Madras. This factory was built with a 25 year master development

staff which provided for each new building to be linked by a network of wide all weather roads. The factory had its own railway siding.

The bought out items constituted 50% of the total value of the vehicle. Ashok Leyland obtained its supplies of castings from Ennore foundries. The ancillaries set up by the company around the plant at Ennore supplied the components. The company did not have a machine tool plant of its own. It depended on HMT Ltd., a public sector machine tools manufacturing company for its requirements of both special purpose and general purpose machines. Since HMT Ltd. supplied machinery for many other manufacturers, the lead times for delivery was as high as three years and also the cost of machinery was going up. The material consumption accounted for 64.5% of the sales value. Imported items constituted around 16% of the total consumption in 1980. In 1992, imported items constituted only 7% where as the material consumption is still around 60%.

To support its expansion plan, the company had embarked on a plan to ensure continuous and increased supply of raw materials and castings. In association with Tamil Nadu Industrial Development Corporation, the company had set up a new company called Automotive Castings Ltd., with a production capacity of 15000 tonnes. The company had undertaken to provide managerial and technical help to the ancillaries. It assisted the small entrepreneurs to set up ancillary industries in Tamil Nadu, Rajasthan and Maharashtra.

The company relied mostly on the skills of the workers than on the automation (Dixit [1982]) and pursued the policy of having separate facilities for many of its models.

Marketing

The products of the company were marketed through dealers and company sales offices. The dealer network was concentrated in south and midwest. The customers bought the chassis and got the body built outside. The Ashok Leyland vehicles commanded a premium. They were known for their quality and performance. The institutional buyers like the transport undertakings placed orders directly on the company. The company's advertisement claimed that its Viking and Cheeta models that provided larger seating capacity were popular with the state transport undertakings. The advertisements also claimed that 75% of the fleet in metropolitan cities was constituted by Ashok Leyland vehicles. This success of passenger transportation is matched by the company's success in goods transportation. The defence services, giant corporations like IOC, HP, NIDDB , ONGC etc. choose Ashok Leyland. As do state electricity boards, PWDs, municipal corporations and collieries. And needless to add, to a large number of private fleet operators, Ashok Leyland is the first choice for long distance haulage.

The after sales service was provided by a wide network of dealers and service stations. In 1980, the company extended its dealer network by setting up additional outlets. The company had set up a separate division that maintains a comprehensive stock of spares. It sold the spare parts under the name Leyparts. The field service engineers supported by fully equipped service vans ensured that Ashok Leyland were in operation and gave trouble free service.

The customers for the marine and industrial engines included individual fishermen, gen set manufacturers and government agencies, and the company supplies them to the original equipment manufacturers and also

to the replacement market.

Exports

Ashok Leyland entered the export market in 1972-73. The vehicles were exported to Afghanistan, Jamaica, Nigeria, Oman, Philipines and Sri Lanka.

Research and Development

In 1975, the technical collaboration agreement with British Leyland Ltd. expired and the government of India did not allow the company to renew the agreement. Till then the R&D activity focused on indigenisation only. Stressing the new role which the R&D was called upon to play after the expiry of the technical collaboration agreement, the then chairman in his annual statement at the 28th general body meeting said, "The time has come for the company to be as nearly self-sufficient as possible in its R&D activities. I am happy to say that the company's research and development personnel are not lagging behind in any way in accepting the responsibility".

In 1979, the company spent Rs.2.84 crore in equipping the R&D division with modern and uptodate facilities. In 1980 the expenditure almost doubled to Rs.4.4 crore. In 1990, the expenditure on R&D read Rs.8.1 crore.

The company had job shop type of production and produced multiple models. The company was following PWP (plant within plant) concept. According to Skinner, this concept is very successful in most of the industries. Inspite of this, the company seems to be not so successful.

Current Status

With total assets of Rs. 776.49 crore and sales of Rs. 1030.65 crore in 1991-92, Ashok Leyland Ltd. was among the top companies in the private sector in India. It produced a wide range of medium and heavy duty commercial vehicles for various applications, engines, spare parts and others in its plants at Ennore, Hosur, Alwar and Bhandara.

Exhibit

HIGHLIGHTS OF PERFORMANCE

(Rs. crores)

Items	1960	1965	1970	1976*	1980	1985	1990*	1991	1992
Sales	7.6	20.2	33.4	127.5	233.7	334.4	861.5	922.9	1030.6
PBT	0.5	2.1	2.2	14.0	12.7	4.5	30.6	41.4	26.9
PAT	0.4	1.1	1.1	6.5	12.7	4.5	23.1	26.3	24.4
FA	2.6	5.5	6.9	14.1	60.3	135.6	163.5	200.5	272.3
CA	3.6	8.7	16.4	32.8	82.4	102.1	209.2	242.6	343.5
Investments	0.1	0.4	0.5	0.5	0.6	0.7	2.6	5.4	160.7
Dividend(%)	8	10	9.5	18	20	10	31.5	27	27
Employees	--	3364	3911	5001	7878	10802	12021	12329	12338

* ----- For 15 months

PBT----- Profit Before Tax

PAT----- Profit After Tax

FA----- Fixed Assets

CA----- Current Assets

APPENDIX B

EMA INDIA LTD.

Company Background

In 1973, Shri Hari Bhargava founded an agency called EMA-India Induction Heating Company Private Limited in collaboration with Elektro Maschinen K.G. Schultze & Co. GMBM Germany to supply Induction heating equipment to Indian industries. Soon after in 1976, with the technical collaboration of the German company, it went into the manufacture of the Induction heating equipment. In the same year, the company changed its name to EMA India Ltd. The plant was located in Panki industrial area in Kanpur. The company gained good reputation among its customers. In 1986, in a plan to expand and diversify, the company set up a manufacturing unit for honing machines in collaboration with Maschinen Fabrik Gearing GMBH Germany. The plant is located at Mandana in Kanpur.

The Product Markets

The major products of EMA are Induction heating equipment. They can be classified as Induction hardening, Induction brazing, Induction melting and Induction forge heating equipment. EMA is manufacturing induction hardening machines only. These equipment are generally supplied to automobile industries, earth moving equipment industries, Defence sector and manufacturers of hydraulic equipment. Some of the major companies which are customers of EMA are TELCO, Escorts, Hero Honda, Hindustan Motors, Premier Automobiles Ltd., Mahindra & Mahindra and Ashok Leyland in the automobile sector; BEML, L&T, HM in the earth moving

equipment sector and L&T, Wipro in the hydraulic equipment sector. Honing machines are used to correct bore geometry of engine blocks, gun barrels, cylinder lining. In general they are used for better surface finish of products that require high level of accuracy. Honing machines are supplied to most of the buyers of induction heating equipment.

Competitors

In the induction heating equipment, EMA faces tough competition from GEC (Calcutta), Inductotherm (India) Ltd. (Ahmedabad), Kirloskar Electric (Mysore) and Electrotherm (India) Ltd. (Ahmedabad). The approximate market share of EMA in induction hardening equipment is 30%.

Manufacturing

EMA manufactures ten to twelve machines per year. Presently fifteen orders are under execution. In the induction heating section about 80% components are indigenous whereas for honing machines, the import content is 60%. One of the main reasons for very high import content in honing machines is relatively new collaboration and slow pace of R&D.

The mode of production is batch manufacture or job shop manufacture depending on the frequency of the orders. The minimum lead time of completion of a product is around 8-10 months with maximum going to more than one year. Certain special motors are imported from abroad which have a lead time of about four months. Electronic circuit boards are also imported with similar lead times. All the jobs are made to order and customized depending on the requirements of the customers. Customer

companies place the order directly with the company stating the specifications required. Agents of the company placed at different places play an instrumental role in getting the orders. Minimum inventory of the imported components is maintained which is one of the main reasons for the long lead time. As many components are costly, maximum efforts are made to keep inventory at a low level. As such the company is using conventional ABC system of inventory policy. Costly and imported items are given A class consideration. As the induction heating equipment are to be custom made, it is very difficult to have large inventories since each equipment requires different types of components. Only a few common components are stored. Main technology for manufacturing is provided by the collaborator and the design people in the company (mechanical and electrical) adapt the technology to suit the Indian environment. The company gives serious consideration for quality control. Electrical and mechanical people will do separate checks besides final inspection. Service people will do final check after installation of the equipment in the customer company. High quality is enforced by specialisation.

Some of the advantages of induction heating are: quick heating, less scale loss, fast start up, energy savings, high production rate, reduce labour costs, easy automation and control, reduced floor space requirement, quiet, safe and clean working conditions, low maintenance requirements. Some of the specific advantages of induction hardening include improved torsional, bending, fatigue and wear strengths, precise repeatability, possibility of partial or selective hardening of component, least possibility of operator suffering from heat and no production of combustion.

Hardening by induction can often contribute to cost saving by substitution of carbon steel for alloy steel, increase in production, reduction in prime labour personnel, elimination of machine operation, in-line production set-up, less handling of parts, automation of hardening operation, less equipment maintenance, less floor space, less energy per piece, less distortion, less inspection, less scrap.

Induction hardening equipment are required in the manufacture of the components of automobile, earth moving equipment, defence, hydraulic equipment and these are: Rear axle, axle rod, crank and cam shafts, cylinder lining, connecting rods, gears, track links, track rollers, track pins, guns, rifle bore, cylinder ram etc. Induction brazing equipment is used in the manufacture of tips of carbide tools, petrol tanks, drill rods etc. Induction forge heaters can be used as replacement for coal fired and oil fired furnaces used for batch heating of forged products.

Research and Development

Some of the specific areas in which R & D is carried out by the company are development of new electronic control systems and substitution of costly imported systems with economical equivalent indigenous systems. The company has successfully indigenised several items, which were being imported. In fact M.F.Transformers, current transformers and other parts are now being regularly exported by the company which were earlier imported. Future plans include studies being undertaken to develop economical models of the equipment as also PLC/CNC models as well as low cost electronic convertors. The total R & D expenditure is 0.3% of total turnover. The company's R&D efforts resulted in lesser import content.

The company is making good efforts for technology absorption, adaptation and innovation. Some of the efforts include improvement and new developments in electronic systems used in the company's equipments. Some of the benefits include improvement in quality and reliability and reduction in cost. The company adapts the technology provided by the collaborator to suit the Indian conditions. There is no technological barrier as such but only regulation of the government is with regard to phased manufacture programme. Mostly technological environment has remained stable.

The company is exporting five items viz., M.F.Transformers H.K. series, M.F.Current transformers, inductors mounting plates, M.F. Power change over blocks, inductors and CNC/PLC induction heating equipment. The company is always making efforts by personal visits and development of new items for export. The company is planning to increase export of more components of induction heating equipment as also complete equipment.

Marketing / Sales

The company has a separate sales department headed by a deputy general manager. The main activities of this department is to identify prospective customers. The company's main aim is to improve market share. This department operates through marketing agents based in Bangalore, Bombay, New Delhi and Calcutta covering south, west, north and east territories respectively. The need for the equipment arises as a result of any of the following reasons such as replacement of old equipment, augmenting of production equipment, modernistic or for new projects. The marketing agents should identify the requirements and report to the

company. The company is in such an industry for which minimum advertisement is necessary. The company gives advertisements in magazines such as Indian Exports Bulletin, Indian Trade Journal, CEI, ASSOCHAM hand-outs and souvenirs brought out by prestigious institutions like IIT Kanpur etc. when work shops are conducted. Customers generally give preference to cost, quality and delivery in that order. The company has highly qualified personnel stationed at different regions for after sales service in addition to a separate division in the head quarters.

Strategy Making

The company's main think tank includes mainly Managing director and Joint Managing director and Chief general manager (Tech). The company runs on these people's ideas. Generally periodic brainstorming is carried out by senior management groups for novel solutions to problems. As time pressures are not often substantial, much thought and analysis enter into key decisions. Generally long term goals and strategies are emphasized. There is no formalized, systematic search for and evaluation of opportunities for acquisitions, new investments, new markets, etc. There is no systematic long-term forecasting of sales, profits and the nature of the markets; long-term forecasting of the technology relevant to products and services offered by firms; planning of long-term investments.

The company gathers information about the environment using methods such as (i)routine gathering of opinion from clients; (ii)explicit tracking of the policies and tactics of competitors; (iii)forecasting sales, customer preferences, technology etc. Customers' preference is for good quality for reasonable costs. There was a time when only quality

is considered irrespective of cost. Presently cost became the prime factor. There are no rapid technological changes over a period of time. There are only moderate changes such as motor generator sets to solid state convertors and oscillator valve system to transistorised convertors. Generally efforts to arrive at consensus decisions is given utmost importance but when this is not possible, the managing director's say counts. Only moderate importance is given to bargaining and discussion for middle and top management in the resolution of problems, conflicts, or decisions. The company always try to be ahead of competitors in product novelty or speed of innovation. The company tries to cooperate and coexist with competitors. The company feels that due to the nature of the environment, it is best to explore it gradually via timid, incremental behaviour. Generally there is reasonable amount of interaction between different departments in solving mutual problems and for devising common strategies for needy situations.

Structure

The company started as an entrepreneurial holding company and has remained so in the past two decades. The managing director and joint managing director are from the owning family. Under them, the structure is more or less informal because of the small size (around 350 employees in all). The major departments are sales, finance, electrical and mechanical design, research and development, production and assembly, quality control etc. The structure can be studied under the following heads: specialization, standardisation, formalization, centralization, configuration and flexibility. There is good deal of flexibility in the

organization. Centralization is to the maximum extent. There is not enough freedom to take decisions at the lower level. There is minimum amount of standardisation of procedures as the products are not standardised, but are customised. Specialization is given importance in the company. Efforts to have specialists doing various activities is given prime importance.

Exhibit 1

Highlights of performance

(Rs. lakhs)

Items	1975	1980	1985	1989	1990	1991	1992
SALES	8.96	97.98	207.87	569.35	673.90	925.62	1199.36
PBT	0.94	12.07	35.36	75.90	78.45	113.74	125.15
PAT	0.28	5.07	11.56	62.05	43.45	66.24	90.15
NFA	4.68	38.56	60.54	171.62	175.13	166.99	164.12
NCA	14.32	10.97	11.27	283.66	235.41	346.69	444.04
INVST.	--	0.83	0.85	1.06	1.40	35.76	31.44
DIVIDEND%	--	15	18	20	20	20	22

PBT ----- Profit before taxes

PAT ----- Profit after taxes

NFA ----- Net fixed assets

NCA ----- Net current assets

INVST. -- Investments

Exhibit 2

Important Notes

(Rs. lakhs)

Items	1975	1980	1985	1989	1990	1991	1992
Raw Mat.	6.61	54.66	76.85	220.93	247.42	408.83	585.45
IHE (Qty.)	1	5	10	12	11	13	15
IHE (val.)	8.38	87.55	166.08	351.92	426.11	564.50	540.96
Parts	0.58	2.19	14.34	---	---	---	---
TK & Sprs	--	7.06	23.97	61.80	154.09	147.53	165.65
HM (Qty.)	--	--	--	4	2	3	5
HM (val.)	--	--	--	141.49	57.49	172.63	421.06
RM (imp %)	75.9	73.2	65.6	60.1	51.9	60.0*	64.0*

IHE ----- Induction Heating Equipment

TK & Sprs ---- Tool kit and spares

HM ----- Honing Machines

RM (imp %) --- Raw material import as a percentage of total value